A. SCIENCE CONNECTIONS

Content Standard: Students in Wisconsin will understand that among the science disciplines there are unifying themes: systems, order, organization, and interactions; evidence, models, and explanations; constancy, change, and measurement; evolution, equilibrium, and energy; form and function.

Rationale: These unifying themes are ways of thinking rather than theories or discoveries. Students should know about these themes and realize that the more they learn about science the better they will understand how the themes organize and enlarge their knowledge. Science is a system and should be seen as a single discipline rather than a set of separate disciplines. Students will also understand science better when they connect and integrate these unifying themes into what they know about themselves and the world around them.

Performance Standards: By the end of grade four students will:	***Sample Alternate Performance Indicators:*** **(1-3 per standard)**	***Sample Performance Activities/Tasks:*** **(1-2 per indicator)**	***Sources of Data***
A.4.1. When conducting science investigations, ask and answer questions that will help decide the general areas of science being addressed [2]	1. Identify the three domains of science (earth/space, life/ environmental, and physical) [1]	1.a. Sort items into appropriate science domains (2) 1.b. Make a collage for each science domain {2) 1.c. Complete three separate investigations and/or experiments and identify the domain each experiment represents (2/3)	
	2. Identify a question that can be answered through a science investigation [2/3]	2.a. Using graphics and/or visuals, convey a question that can be answered in a scientific manner (2) 2.b. Choose a question that can be investigated scientifically (2)	
	3. Identify the general area(s) of science being addressed in a question. [2]	3.a. In cooperative groups, generate a question and design an experiment. Identify the science domain of this question and experiment (3) 3.b. Ask and answer questions relating to which science domain(s) an experiment and/or investigation represents (2)	
A.4.2. When faced with a science-related problem, decide what evidence, models, or explanations previously studied can be used to better understand what is happening now [2]	1. Identify background knowledge related to a problem [2]	1.a. Use graphic organizers such as KWHL charts (2/3) K= what you know W = what you want to know H = how will you find out L = what you learned	

		1.b. Create a word web or semantic map [2] 1.c. In a small group, generate a problem and specify the necessary steps to solve the problem (3)	
A.4.3. When investigating a science-related problem, decide what data can be collected to determine the most useful explanations [2]	1. Name data sources, e.g., parents, teachers, books, videos, and experiments [1] 2. Determine what data are necessary to solve the problem [2]	1.a. brainstorm all possible data sources (1) 2.a. Given types of data, choose the data relevant to the problem (2) 2.b. Discuss the answers to questions generated in a KWHL chart(2/3) K = what you know W = what you want to know H = how will you find out L = what you learned	
A.4.4. When studying science-related problems, decide which of the science themes are important[2]	1. Identify the science themes [1] 2. Choose the science themes important to the problem [2]	1.a. Given a student-initiated or teacher-initiated demonstration, identify the science theme being displayed (1) 1.b. Participate in activities to demonstrate each science theme (1) 2.a. Given a graphic of a problem, identify the science theme(s) important to the science-related problem(2) 2.b. Match the science theme(s) to given problems (2)	
A.4.5. When studying a science-related problem, decide what changes over time are occurring or have occurred [2]	1. Identify changes that are occurring or have occurred[2]	1.a. After observing an example of changes shown on a video, identify the stages of those changes (1) 1.b. Use pictures to show changes over time (2) 1.c. Create a timeline to show changes over time (2)	
Performance Standards: By the end of grade eight students will:	***Sample Alternate Performance Indicators:* (1-3 per standard)**	***Sample Performance Activities/Tasks:* (1-2 per indicator)**	***Sources of Data***

A.8.1. Develop their understanding of the science themes by using the themes to frame questions about science-related issues and problems [2]	1. Identify science themes [1] 2. Based on a current issue/problem, develop a question to ask using at least one of the science themes, e.g., measurement, order [2]	1.a. Given a student-initiated or teacher-initiated demonstration, identify the science theme being displayed (1/2) 1.b. Participate in activities to demonstrate each science theme (1) 2.a. Using graphics and/or visuals, convey a question that can be answered in a scientific manner (2) 2.b. Choose questions which are related to a particular science theme from a list of questions related to a problem (1/2) 2.c. Formulate two questions to explain how to further investigate the issue using resources, e.g., a newspaper, books, the Internet, or people as experts (3)	
A.8.2. Describe limitations of science systems and give reasons why specific science themes are included in or excluded from those systems [3]	1. Identify a given cause's effect on a science system [3]	1.a. Given a science system, illustrate the extent of limitations, e.g., the effect of smoking on respiration [(3	
A.8.3. Defend explanations and models by collecting and organizing evidence that supports them and critique explanations and models by collecting and organizing evidence that conflicts with them [3}	1. Build and use background knowledge about a particular model or explanation [3] 2. Defend and critique a model or explanation [3]	1.a. Create a physical model to trace the identified process (2) 1.b. Brainstorm a variety of explanations and models (3) 2.a. Collect information (observations, resources) and classify the information as supporting or refuting the model (2) 2.b. Evaluate a model or explanation using given collected data and/or a visual, e.g., discussion web (3)	
A.8.4. Collect evidence to show that models developed as explanations for events were (and are) based on the evidence available to scientists at the time [2]	1. Collect evidence to show that models developed as explanations for events were (and are) based on the evidence available to scientists at the time (same as performance standard) [2]	1.a. Compare and contrast historical earth maps to current earth maps. Include the concepts of flat vs. round. Identify the reasons for the changes (2)	
A.8.5. Show how models and	1. Show how the accumulation of new	1.a. Compare and contrast earth maps from the 1400's to the	

explanations, based on systems, were changed as new evidence accumulated (the effects of constancy, evolution, change, and measurement should all be part of these explanations) [2]	evidence changed models and explanations based on systems [3]	present, including the concepts of flat vs. round. Identify the reasons for the changes (3)	
A.8.6. Use models and explanations to predict actions and events in the natural world [2]	1. Construct a model to explain an event in the natural world [2/3] 2. Identify the cause and effect of temperature changes [2]	1.a. Construct a stream table (2) 1.b. Model an oil spill and conduct a cleanup procedure(2) 2.a. Fill a container with water, put it in the freezer and compare it to winter phenomena (2) 2.b. Boil water to compare it to the evaporation process (2)	
A.8.7. Design real or thought investigations to test the usefulness and limitations of a model [3]	1. Design an investigation to test a model's usefulness and limitations [3]	1.a. Complete a graphic organizer listing the usefulness and limitations of a model car in relationship to a real car (2)	
A.8.8. Use the themes of evolution, equilibrium, and energy to predict future events or changes in the natural world [2]	1. Predict the effect of a future event [3]	1.a. Use background knowledge of erosion to predict the future of river valleys compared to the Grand Canyon (3) 1.b. Monitor a local body of water to predict and observe the time from ice to melt (3)	
Performance Standards: By the end of grade twelve students will:	***Sample Alternate Performance Indicators:*** **(1-3 per standard)**	***Sample Performance Activities/Tasks:*** **(1-2 per indicator)**	***Sources of Data***
A.12.1. Apply the underlying themes of science to develop defensible visions of the future	1. Identify possible future problems 2. Develop a defensible vision of the future based on a problem	1.a. Using computers and/or newspapers, list beginning problems that may worsen 2.a. Model a possible scientific discovery (e.g., living on the moon, video phone) to solve a problem 2.b. Draw a picture or create a model to show the student's city at a given future point	

A.12.2. Show how conflicting assumptions about science themes lead to different opinions and decisions about evolution, health, population, longevity, education, and use of resources, and show how these opinions and decisions have diverse effects on an individual, a community, and a country, both now and in the future	1. Identify conflicting assumptions about science themes 2. Show how conflicting assumptions lead to different opinions and decisions 3. Show how these opinions and decisions have diverse effects	1.a. Using interviews, newspapers, and/or computers, list science themes found in resources and conflicting assumptions concerning them 2.a. Present research on a set of conflicting assumptions about a chosen science theme 2.b. Debate conflicting assumptions with a native language group 3.a. Interview and compare in a visual (e.g., a Venn diagram) people who hold conflicting assumptions on a science theme	
A.12.3. Give examples that show how partial systems, models, and explanations are used to give quick and reasonable solutions that are accurate enough for basic needs	1. State problems that occur in everyday life 2. Determine which solutions to current problems are based on partial models, explanations and systems	1.a. Create and administer a survey to other students to determine everyday problems 2.a. List examples showing the use of partial systems, models, and explanations for quick and reasonable solutions 2.b. After watching infomercials, generate questions to challenge the partial explanation, system or model represented	
A.12.4. Construct arguments that show how conflicting models and explanations of events can start with similar evidence	1. Identify different types of evidence 2. Investigate conflicting models to find examples that start from the same evidence 3. Design a model based on evidence	1.a. Assemble a list of the types of evidence 2.a. Given conflicting models and explanations, research and record the evidence to support each model 3.a. Based on the evidence given, create a model or explanation of the evidence	
A.12.5. Show how the ideas and themes of science can be used to make real-life decisions about careers, work places, lifestyles, and use of resources	1. Show science's use in making real-life decisions	1.a. Identify a variety of ideas related to science and real life 1.b. Use the identified ideas to justify, in picture, verbal or written form, the student's career or lifestyle decisions	
A.12.6. Identify and replace inaccurate personal models and	1. Identify personal models and explanations	1.a. Given a teacher-generated science question, illustrate the models and related explanations	

explanations of science-related phenomena using evidence learned or discovered	2. Compare personal models to accurate models 3. Use evidence to replace an inaccurate model	2.a. Given a model, create a visual (e.g., a Venn diagram) to compare it to the personal model 3.a. Given a teacher-generated science question, illustrate an accurate model related to it	
A.12.7. Re-examine the evidence and reasoning that led to conclusions drawn from investigations, using the science themes	1. Re-examine the process that led to a conclusion	1.a. After completing the experiment, compare collected data to data from other students 1.b. Collect data multiple times and compare the results (e.g., measure the speed of a car three times and compare)	